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ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT
OF TACTICAL NUCLEAR WARFARE

The BDM Corporation
7915 Jones Branch Drive
McLean, Virginia 22102

6 April 1979

Topical Report for Period 2 January 1979-6 April 1979

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20. ABSTRACT (Continued)

were reviewed, and interviews with fifteen experts in the areas of human behavior and performance and tactical nuclear warfare were conducted. Resulting issues were summarized and prioritized, key points identified, and shortcomings determined. Specific recommendations for continued research are presented.

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ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF TACTICAL NUCLEAR WARFARE

SUMMARY

OBJECTIVE

One uncertainty associated with the effectiveness of military operations in a nuclear environment is the nature of the psychological response of combat personnel and the impact of this response on individual performance. Present doctrine assumes no qualitative difference in response to conventional or nuclear warfare. Current concern regarding the validity of this assumption, the increasing sophistication of tactical equipment, and a realization of the significance of human factors in military operations has prompted a reexamination of this issue.

The objective of this program is to summarize the current status of research in this area, to identify the major issues, and to recommend directions for further study.

APPROACH AND METHOD

Studies concerning human response under stress and analyses of psychological response to conventional warfare were reviewed, and interviews with fifteen experts in the areas of human behavior and performance and tactical nuclear warfare were conducted. Both the literature review and the interviews focused on issues concerning: problem relevance; status of research; key issues; response control; and ideas for further study. The resulting issues were summarized and prioritized, key points identified, and shortcomings in available knowledge determined. Based on a consideration of these findings, specific recommendations for continued research were developed.

MAJOR FINDINGS

Available studies and current research relevant to this issue are extremely limited, while community opinion is diverse. Two points of general consensus concern: first, the significance of this issue; and second, the need for training in establishing an effective "performance repertoire" within a nuclear environment. Lack of quantification represents the major difficulty in this research area. A specific recommendation for the inclusion of human performance variation in existing combat simulations is proposed as a first step in the development of a quantitative tool.

**ISSUES CONCERNING PSYCHOLOGICAL
RESPONSE TO
TACTICAL NUCLEAR WARFARE**

DEFENSE NUCLEAR AGENCY

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**BRIEFING
OUTLINE**

- OBJECTIVES
- APPROACH
- KEY STUDY QUESTIONS
- THE LITERATURE
- THE COMMUNITY
- SUMMARY OF ISSUES
- RECOMMENDATIONS
- SUMMARY

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

OBJECTIVES

- TO IDENTIFY AND PRIORITIZE ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF NUCLEAR WARFARE ON COMBAT PERSONNEL
- TO PROPOSE ALTERNATIVE METHODS FOR THE INVESTIGATION OF THESE ISSUES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RESEARCH OVERVIEW

WHY CONSIDER THIS ISSUE?

- RELEVANT DATA EXISTS, BUT IT IS INCONCLUSIVE
- SERIOUS INTEREST IS DEVELOPING BECAUSE OF:
 - *INCREASING EQUIPMENT COMPLEXITY*
 - *A REALIZATION OF ITS POTENTIAL IMPACT*
- THERE IS A NEED TO DETERMINE:
 - *CURRENT RESEARCH STATUS*
 - *DIRECTIONS FOR FURTHER RESEARCH*
 - *DNA POSTURE*

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

APPROACH

- INTERVIEW KEY PERSONNEL
- REVIEW THE LITERATURE
- IDENTIFY AND PRIORITIZE ISSUES
- PROPOSE ALTERNATIVE RESEARCH
METHODOLOGIES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

STUDY QUESTIONS

- IS THIS A RELEVANT PROBLEM?
- WHAT WORK IS BEING DONE NOW AND WHO IS DOING IT?
- WHAT ARE THE DRIVING ISSUES?
- WHAT COULD BE DONE TO MINIMIZE ANY POTENTIAL PSYCHOLOGICAL IMPACT?
- HOW CAN FURTHER INVESTIGATIONS BE PERFORMED?

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

THE LITERATURE – AN OVERVIEW

- WHAT WAS REVIEWED:
 - “THE VINEBERG STUDY”
 - INVESTIGATIONS OF THE IMPACT OF STRESS
 - REVIEWS OF PSYCHOLOGICAL CASUALTIES IN CONVENTIONAL WARFARE
- GENERAL OBSERVATIONS:
 - RESEARCH HAS BEEN EXTREMELY LIMITED
 - CURRENT DOCTRINE AND IDEAS REPRESENT AN EXTRAPOLATION FROM CONVENTIONAL WARFARE RESULTS AND “APPROXIMATING” LABORATORY INVESTIGATIONS
 - THE IMPACT OF PSYCHOLOGICAL RESPONSE “IN THE LARGE” HAS NOT BEEN CONSIDERED

THE LITERATURE - PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE SPECIFIC OBSERVATIONS

- IN GENERAL COMBAT ENVIRONMENTS:
 - LEADERS ARE UNDER MORE STRESS THAN FOLLOWERS
 - NEAR HITS ENHANCE ANXIETY
 - PSYCHIATRIC CASUALTIES ARE RELATED TO MOS, UNIT TYPE, AND NUMBER OF PHYSICAL CASUALTIES

- IN NUCLEAR COMBAT ENVIRONMENTS, ONE EXPECTS:
 - QUALITATIVE SIMILARITY TO CONVENTIONAL WARFARE
 - INCREASED ISOLATION
 - GREATER PRE-BURST APPREHENSION

*PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE*

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

SUMMARY OF KEY ISSUES

FIRST ORDER THEMES

- THE PROBLEM IS QUITE RELEVANT
- THERE IS NO DIRECT ON-GOING RESEARCH
- DATA ARE INSUFFICIENT AND DIFFICULT TO COMPILE
- APPROPRIATE CBR RESPONSE DOES NOT EXIST IN
THE CURRENT BEHAVIORAL REPERTOIRE OF
COMBAT PERSONNEL

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

SUMMARY OF KEY ISSUES

SECOND ORDER THEMES

- A SIGNIFICANT PREMIUM WILL BE PLACED ON INDIVIDUAL SURVIVAL
- LEADERS WILL BE AFFECTED MORE THAN FOLLOWERS
- ALL PERSONNEL WILL SUFFER SOME FORM OF PSYCHOLOGICAL CASUALTY
- THE RESPONSE WILL BE AGENT-PROXIMITY SENSITIVE
- GAS IS MORE FRIGHTENING
- OTHER RELEVANT FACTORS INCLUDE:
 - UNIT COHESION
 - INTENSITY OF BATTLE
 - KNOWLEDGE OF SITUATION
 - ISOLATION
 - MISTRUST OF AUTHORITY
 - COMMUNICATION
 - POSITIVE LEADERSHIP
 - DANGER PAST

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

SUMMARY OF KEY ISSUES

THIRD ORDER THEMES

- SIGNIFICANCE OF EQUIPMENT BREAKDOWN UNDER STRESS
- MEANING OF "PSYCHOLOGICAL CASUALTY"
- EXPECTED PERFORMANCE OF THE CURRENT ARMY AND INCLUSION OF CULTURAL EFFECTS
- APPROPRIATENESS OF ORGANIZATIONAL DEVELOPMENT

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

ISSUE DIFFERENCES

- PERFORMANCE
 - *NO DIFFERENCE FROM WW II*
 - *100% PSYCHOLOGICAL CASUALTIES*
 - *SIGNIFICANT UNCERTAINTIES IN CURRENT PERFORMANCE*

- DATA
 - *NATURAL DISASTER DATA ARE NON-ANALOGOUS*
 - *MANY-GROUP ISOLATION PHENOMENA ARE RELEVANT*
 - *DATA ADMIT ANY CONCLUSION*

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

WHAT SHOULD BE DONE

- TRAINING
 - *GENERAL AS WELL AS SPECIFIC*
 - *PSYCHOLOGICAL FIRST-AID*
 - *DE-SENSITIZATION*
- BETTER EQUIPMENT AND REPLACEMENT POLICIES
- INCREASED UNDERSTANDING OF STRESS ON THE TACTICAL BATTLEFIELD
- PSYCHOLOGICAL RESEARCH IN CURRENT EXERCISES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

DIFFICULTIES

- RELATIVE IMPORTANCE OF ISSUES
- QUANTIFICATION REQUIREMENTS
- EXTRAPOLATION ASSUMPTIONS
- DATA COLLECTION AND DATA BASE DEVELOPMENT

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

WHAT OUGHT TO BE DONE

- **QUANTIFY THE IMPACT OF A TACTICAL NUCLEAR ENVIRONMENT ON THE PERFORMANCE OF COMBAT PERSONNEL**
- **DETERMINE THE IMPACT OF THIS RESPONSE ON SIMULATED BATTLE OUTCOME**
- **DEVELOP APPROPRIATE TRAINING/OPERATIONAL/ORGANIZATIONAL RECOMMENDATIONS**

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

SOME CONSIDERATIONS

- THERE ARE NO "REAL" ANSWERS
- THERE IS NO SYSTEMATIC WAY TO STUDY ACTUAL INDIVIDUAL PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE
- THE MOST USEFUL APPROACH IS TO PROVIDE PLANNERS AND COMMANDERS WITH A RANGE OF ALTERNATIVES

*PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE*

**A KEY OPERATIONAL
IDENTIFICATION**

**PSYCHOLOGICAL
RESPONSE** = **HUMAN
PERFORMANCE**

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RESEARCH APPROACH

EXEMPLARY RESEARCH PROGRAMS (OR, FIRST STEPS TOWARD QUANTIFICATION)

- **SIMULATION**
 - *EMPLOY A DNA-SPONSORED COMBAT SIMULATION TO INVESTIGATE THE SENSITIVITY OF KEY MOEs TO A RANGE OF VARIATION IN HUMAN PERFORMANCE*

- **ANALYSIS**
 - *EMPLOYING CURRENT TACTICAL HARDWARE SYSTEMS, INVESTIGATE THE DYNAMICS OF THE MAN-MACHINE INTERFACE IN STRESSFUL ENVIRONMENTS*

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

AN EXAMPLE

T-COR

- A THEATER LEVEL MODEL WITH TWO LEVELS OF DETAIL
 - DIVISION LEVEL (*AGGREGATE CORPS*)
 - COMPANY LEVEL (*DETAILED CORPS*)
- REALISTICALLY PORTRAYS COMBAT TO ANALYZE
 - BREAKTHROUGHS, PENETRATIONS, ENVELOPMENTS,
ETC.
- USE OF TACTICAL NUCLEAR WEAPONS
 - IMPACT OF C3
 - ALTERNATIVE ROLES AND MISSIONS FOR TACTICAL AIR RESOURCES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

WHY T-COR?

- AS A THEATER-LEVEL COMBAT SIMULATION, T-COR IS SENSITIVE TO VARIATIONS IN BATTLE EVOLUTION WITH VARIATIONS IN HUMAN PERFORMANCE
- T-COR IS A STATE-OF-THE-ART CAPABILITY
- T-COR IS A DNA-SPONSORED EFFORT
- T-COR CAN BE USED IN ITS PRESENT FORM

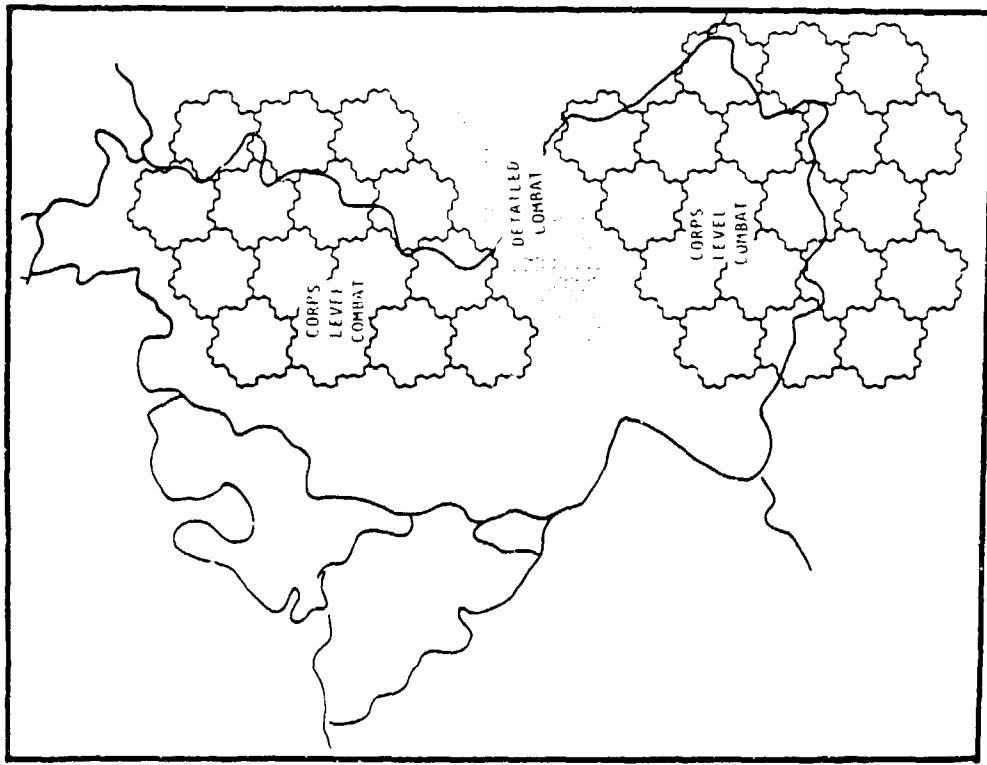
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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

T-COR CHARACTERISTICS

MULTIPLE LEVELS OF DETAIL

- HIGH RESOLUTION COMPONENT IN THEATER LEVEL CONTEXT
- DETAILED CORPS PROVIDES "FINE STRUCTURE"; AGGREGATE CORPS PROVIDE BOUNDARY CONDITIONS
- IMPLEMENTS "HIERARCHY OF MODELS" CONCEPT WITHIN A CONSISTENT MODELING FRAMEWORK
- ITERATIVE "TUNING" OF WHOLE MODEL
- POTENTIAL EXTENSION TO VARIABLE, MODEL-SELECTED LEVELS OF DETAILS



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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

PROCESSES MODELED IN T-COR

PROCESSES GROUND COMBAT

- | <u>IMPLEMENTATION</u> | |
|--|--|
| • DIVISIONS (AGGREGATED CORPS)
COMPANIES (DETAILED CORPS) | |
| COMBAT SUPPORT | • CLOSE AIR SUPPORT
ARTILLERY, MISSILES, MORTARS |
| MOVEMENT | • DIVISIONS (AGGREGATED CORPS)
MANEUVER COMPANIES
ARTILLERY BATTERIES
COMMAND POSTS |
| PLANNING | • INTERPRETS INITIAL ORDERS
FORMULATES ORDER FOR SUB-
ORDINATES |
| THINKING | • OPERATIONS ORDERS
STATUS REPORTS
INTELLIGENCE REPORTS
ARTILLERY/CAS REQUESTS |

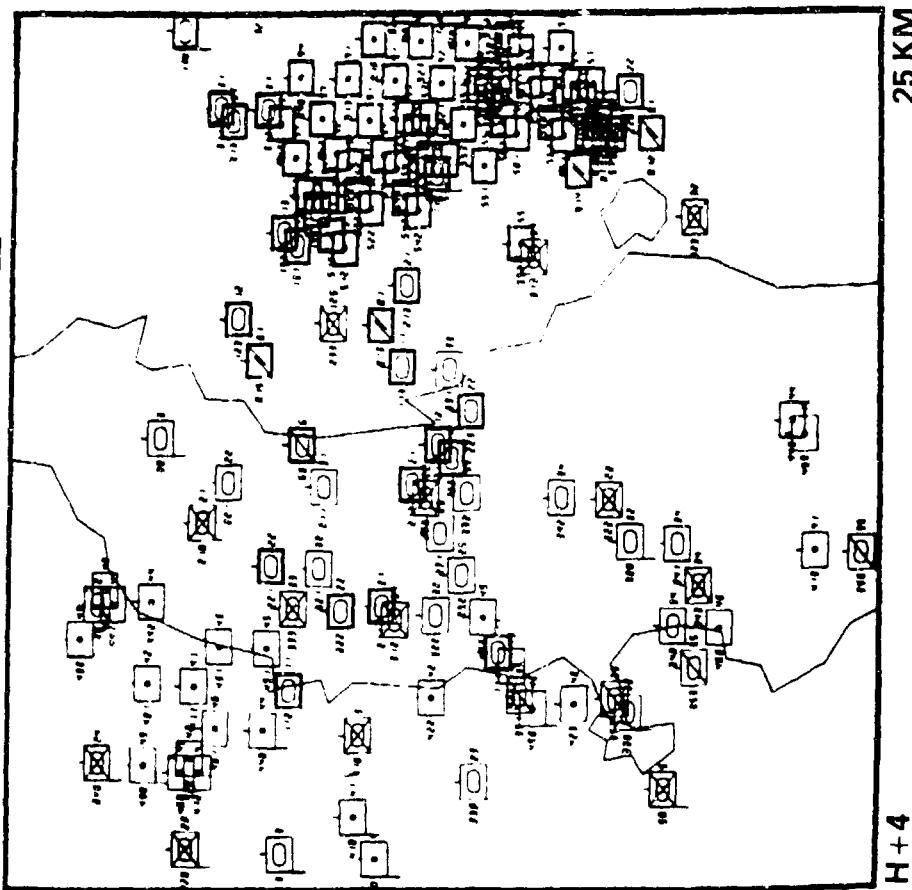
PSYCHOLOGICAL RESPONSES TO TACTICAL NUCLEAR WARFARE

EXAMPLE T-COR OUTPUT

BREAKTHROUGH – PENETRATION OF BLUE POSITIONS

OUTPUT SUMMARY

- REALISTIC MOVEMENT
OF COMBAT FORCES
 - RED PENETRATION
 - BLUE PINCHING
 - OFF PENETRATION



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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

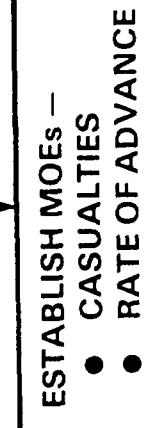
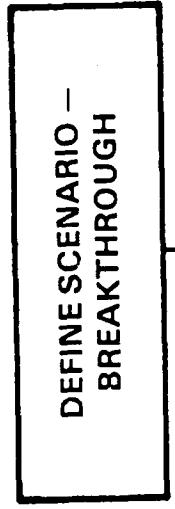
MODELING HUMAN BEHAVIOR IN T-COR

- THE HUMAN PERFORMANCE PARAMETERS
 - BREAKPOINTS: *THRESHOLDS OF ATTRITION*
 - PERFORMANCE: *RATES OF ADVANCE; RATES OF AMMO EXPENDITURE; C3 DELAYS...*
- METHODOLOGY
 - ESTABLISH BASE CASE SCENARIOS AND MOEs
 - VARY HUMAN PERFORMANCE PARAMETERS BASED ON EXISTING AND EXTRAPOLATED DATA
 - SUMMARIZE AND ANALYZE MOE VARIATIONS
- RESULTS
 - A QUANTITATIVE SUMMARY OF THE IMPACT OF VARIATIONS IN HUMAN PERFORMANCE ON KEY COMBAT MOEs

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

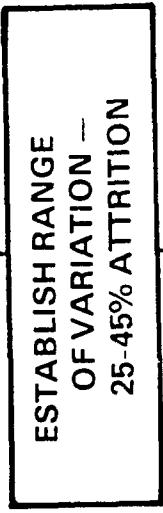
A SPECIFIC EXAMPLE: BREAKPOINT ANALYSIS

TACTICAL CONTEXT



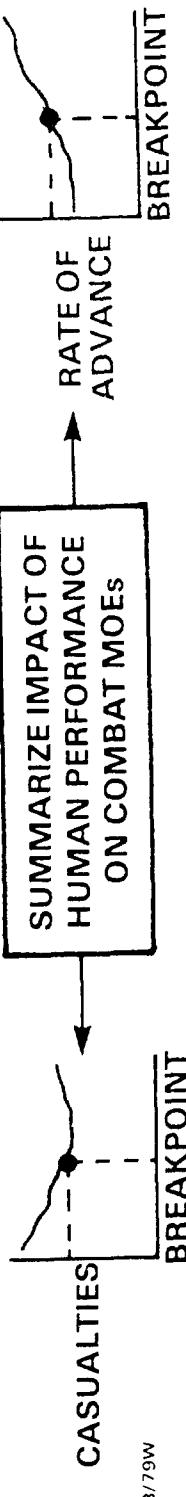
DEVELOP BASE
CASE RESULTS

HUMAN PERFORMANCE



COMPARE

DEVELOP SENSITIVITY
RESULTS



SUMMARIZE IMPACT OF
HUMAN PERFORMANCE
ON COMBAT MOEs

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

UTILITY

- A FIRST STEP IN QUANTIFICATION
- AN IDENTIFICATION OF THE MAGNITUDE OF THE PROBLEM
- AN UNDERSTANDING OF AGGREGATE IMPACT,
RATHER THAN INDIVIDUAL RESPONSE
- A FOCUSING ON AREAS FOR DETAILED INVESTIGATION

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

SUMMARY

- PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE IS NOT WELL UNDERSTOOD, YET COULD BE SIGNIFICANT IN TERMS OF COMBAT EFFECTIVENESS
- PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE SHOULD BE INTERPRETED IN TERMS OF HUMAN PERFORMANCE
- IT IS GENERALLY BELIEVED THAT APPROPRIATE TRAINING WILL MINIMIZE POTENTIAL DEGRADATIONS IN PERFORMANCE
- EFFECTIVE INVESTIGATION OF THIS ISSUE REQUIRES A QUANTITATIVE APPROACH
- HUMAN PERFORMANCE MODELING IN COMBAT SIMULATION COULD PROVIDE A FIRST STEP IN REQUIRED QUANTIFICATION

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Naval Air Systems Command
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Naval Ocean Systems Center
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Naval Sea Systems Command
ATTN: SEA-406
ATTN: SEA-06H2
ATTN: SEA-6431G, H. Seguine

Naval Submarine Base
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Naval Submarine School
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Naval Surface Force, Atlantic
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Naval Surface Force, Pacific
ATTN: Commander

Naval Surface Weapons Center
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Naval Surface Weapons Center
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Naval War College
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Naval Weapons Center
ATTN: Code 31707, L. Thompson

Naval Weapons Evaluation Facility
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DEPARTMENT OF THE NAVY (Continued)

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Newport Laboratory
Naval Underwater Systems Center
ATTN: K. Walsh

Nuclear Weapons Tng. Group, Pacific
Department of the Navy
ATTN: Nuclear Warfare Department

Nuclear Weapons Tng Group, Atlantic
Department of the Navy
ATTN: Nuclear Warfare Department

Office of Naval Research
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Sixth Fleet
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ATTN: Commander

Surface Warfare Development Group
Naval Amphibious Base
ATTN: Commander

Surface Warfare Officers School Command
Department of the Navy
ATTN: Combat Systems Dept.

Commander-in-Chief
U.S. Atlantic Fleet
Department of the Navy
ATTN: P.O. Box 100, Div. 20, Code 22
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U.S. Naval Air Forces, Atlantic Fleet
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ATTN: N326

U.S. Navy Second Fleet
ATTN: Commander

DEPARTMENT OF THE NAVY (Continued)

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ATTN: CINC
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Atlantic Fleet
ATTN: Commander

U.S. Submarine Force
Pacific Fleet
ATTN: Commander

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ATTN: Radiobiology Division

Air Force Weapons Laboratory

Air Force Systems Command
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Department of the Air Force
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Tactical Air Command

Department of the Air Force
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DEPARTMENT OF THE AIR FORCE (Continued)

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General Electric Company—TEMPO
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